Name:

at1117paper: Complete the Square (v307)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 28 feet. Their combined area, found by adding the square's area and the rectangle's area, is 333 square feet. What is the value of x?

Example's Solution

$$x^2 + 28x = 333$$

To complete the square, add $\left(\frac{28}{2}\right)^2 = 196$ to both sides.

$$x^2 + 28x + 196 = 529$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 14)^2 = 529$$

Undo the squaring.

$$x + 14 = \pm\sqrt{529}$$

$$x + 14 = \pm 23$$

Subtract 14 from both sides.

$$x = -14 \pm 23$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 9$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 60 feet. The total area, of the square and rectangle, is 2349 square feet. What is the value of x?

$$x^2 + 60x = 2349$$

$$x^2 + 60x + 900 = 3249$$

$$(x + 30)^2 = 3249$$

$$x + 30 = \pm 57$$

$$x = 27$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 44 feet. The total area, of the square and rectangle, is 885 square feet. What is the value of x?

$$x^2 + 44x = 885$$
$$x^2 + 44x + 484 = 1369$$
$$(x + 22)^2 = 1369$$
$$x + 22 = \pm 37$$
$$x = 15$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 744 square feet. What is the value of x?

$$x^2 + 50x = 744$$
$$x^2 + 50x + 625 = 1369$$
$$(x + 25)^2 = 1369$$
$$x + 25 = \pm 37$$
$$x = 12$$